We claim:

1. An occupant weight sensing apparatus configured to be coupled to a vehicular seat and adapted to isolate vertical forces from non-vertical forces, the apparatus comprising:

a base connectable with the vehicle and having at least one support extending therefrom;

a pivot extending from the at least one support of the base;

a sensor coupled to the at least one support of the base; and

a lever positioned adjacent to the base and having a bifurcated portion and a second portion, the lever coupled to the pivot along the bifurcated portion, the lever connectable with the seat along the bifurcated portion and pivotable about the pivot in response to forces applied to the seat, the sensor limiting the relative movement of the lever with respect to the base and capable of detecting the relative movement of the lever with respect to the base to sense the weight of the occupant, the lever configured to resist bending about an axis parallel to the pivot.

2. The apparatus of claim 1, wherein the second portion of the lever has a width extending in substantially the same direction as the axis of the pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the lever from bending.

3. The apparatus of claim 1, wherein the sensor comprises a hall effect sensor and a magnet, the magnetic field sensed by the hall effect sensor changing as the relative position of the lever with respect to the base changes.

4. The apparatus of claim 1, wherein the lever is coupled to the sensor along the second portion of the lever.

5. The apparatus of claim 1, wherein the pivot is a first pivot and the lever is a first lever, the apparatus further comprising:

a second pivot extending from the at least one support of the base, the second pivot connected to the at least one support at a location different than the first pivot; and

a second lever positioned adjacent to the base and having a bifurcated portion and a second portion, the second lever coupled to the second pivot along the bifurcated portion, the second lever connectable with the seat along the bifurcated portion and pivotable about the second pivot in response to forces applied to the seat, the sensor limiting the relative movement of the second lever with respect to the base and capable of detecting the relative movement of the second lever with respect to the base to sense the weight of the occupant, the second lever configured to resist bending about an axis parallel to the pivot.

6. The apparatus of claim 5, wherein the second portion of the second lever and the second portion of the first lever overlap.

7. The apparatus of claim 6, wherein the sensor extends through the overlapping portions of each lever.

8. The apparatus of claim 5, wherein the forces transferred from the weight of the occupant to each lever is mechanically summed at the sensor.

9. The apparatus of claim 5, wherein the second portion of the second lever has a width extending in substantially the same direction as the axis of the second pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the second lever from bending.

10. The apparatus of claim 5, wherein the second lever is coupled to the sensor along the second portion of the second lever.

11. The apparatus of claim 1, wherein the at least one support of the base is defined by a first wall and a second wall parallel to the first wall, the pivot extending between the first wall and the second wall.

12. The apparatus of claim 11, wherein the lever is positioned between the first wall and second wall of the at least one support.

13. The apparatus of claim 11, wherein the lever is positioned adjacent the first wall, wherein the first wall is located between the lever and the second wall.

14. The apparatus of claim 11, wherein the sensor is coupled to the first wall.

15. The apparatus of claim 11, wherein the at least one support of the base is defined by a first wall, a second wall parallel to the first wall, and a third wall normal to the first and second wall, the pivot extending between the first wall and the second wall.

16. The apparatus of claim 15, wherein a first branch of the bifurcated portion is separated from a second part of the bifurcated portion by the first and second walls.

17. The apparatus of claim 16, wherein the sensor is coupled to the third wall.

18. An apparatus to connect a seat to a floor of a vehicle, the seat having a front, a back, a first side, and a second side opposite the first side, the apparatus comprising:

a first lever positionable between the floor and seat and pivotable about a first axis substantially parallel to the floor and extendale through planes defined by the first and second sides of the seat, the first lever having

a first portion having a bifurcated end and positionable adjacent the first side of the seat, the first axis extending through the bifurcated end and the first portion pivotable about the first axis, the first portion configured to resist bending about a second axis parallel to the first axis;

a second portion having a bifurcated end and positionable adjacent the second side of the seat, the first axis extending through the bifurcated end and the second portion pivotable about the first axis, the second portion configured to resist bending about a third axis parallel to the first axis; and

a third portion connecting the first portion to the second portion, the third portion having a tab extending in a direction substantially perpendicular to the first axis;

a second lever positionable between the floor and seat and pivotable about a fourth axis substantially parallel to the floor and extendable through planes defined by the first and second sides of the seat, the second lever having

a first portion having a bifurcated end and positionable adjacent the first side of the seat, the fourth axis extending through the bifurcated end and the first portion pivotable about the fourth axis, the first portion configured to resist bending about a fifth axis parallel to the fourth axis;

a second portion having a bifurcated end and positionable adjacent the second side of the seat, the fourth axis extending through the bifurcated end and the second portion pivotable about the fourth axis, the second portion configured to resist bending about a sixth axis parallel to the fourth axis; and

a third portion connecting the first portion to the second portion, the third portion having a tab extending in a direction substantially perpendicular to the first axis; and

a sensor extending through the tab of each lever and connecting the first lever to the second lever, the sensor capable of detecting movement of the levers due to weight on the seat and positioned to limit the relative movement of the levers with respect to the base.

19. The apparatus of claim 18, further comprising a first and second pivot extending along the first axis and defining a pivot point of the first lever, the first pivot located on the first side of the seat and the second pivot located on the second side of the seat.

20. The apparatus of claim 19, further comprising a third and fourth pivot extending along the fourth axis and defining a pivot point of the second lever, the third pivot located on the first side of the seat and the fourth pivot located on the second side of the seat.

21. The apparatus of claim 18, wherein the first and second portion of each lever has a width extending in substantially the same direction as the first and fourth axis, respectively and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent bending.

22. An apparatus to connect a seat to a floor of a vehicle, the apparatus comprising:

a first lever configured to be coupled to the floor and pivotable about a first axis that is substantially parallel to the floor, the first lever connectable with the seat at a first end of the lever and pivotable about the first axis in response to forces applied to the seat, the second end of the first lever having an aperture, the first lever configured to resist bending about a second axis substantially parallel to the first axis;

a second lever configured to be coupled to the floor and pivotable about a third axis that is substantially parallel to the floor and located a first distance from the first axis, the second lever connectable with the seat at a first end of the second lever and pivotable about the third axis in response to forces applied to the seat, the second end of the second lever having an aperture, the second lever configured to resist bending about a fourth axis substantially parallel to the third axis;

a sensor configured to be coupled to the floor and located a second distance from the first pivot, the second distance less than the first distance, the sensor extending through the aperture of the first lever and the aperture of the second lever, the sensor limiting the relative movement of the lever with respect to the base and capable of detecting the relative movement of the lever with respect to the base due to forces on the seat.

23. The apparatus of claim 22, wherein the first end of the first lever is bifurcated and the first end of the second lever is bifurcated.

24. The apparatus of claim 22, wherein:

the first lever has a width extending in substantially the same direction as the first axis and height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the first lever from bending; and

the second lever has a width extending in substantially the same direction as the third axis and height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the second lever from bending.

25. The apparatus of claim 22, wherein the forces transferred to each lever from the forces applied to the seat are mechanically summed at the sensor.

26. A method of sensing and isolating a vertical load due to weight applied to a seat, the method comprising:

applying a load to the seat, the load having a vertical force component and a horizontal force component;

transferring the load from the seat to a structure supporting the seat, the structure having a base coupled to a floor, a first lever coupled to the base at a first pivot, and a second lever coupled to the base at a second pivot, a portion of the second lever overlapping and coupled to the first lever, and a sensor coupled to the first and second lever at the overlapping portion;

pivoting the first and second lever with respect to the base due to the vertical force component of the load transferred to the supporting structure;

isolating the horizontal force component at the first and second pivot;

preventing the horizontal force component from acting on the sensor by isolating it at the first and second pivot;

summing the vertical load applied to the first lever and the vertical load applied to the second lever at the sensor; and

sensing the weight applied to the seat by measuring the summed vertical load.

27. An apparatus to connect a seat to a floor of a vehicle, the apparatus comprising:

a base connectable with the floor of the vehicle, the base having at least three connecting locations defined as a first, second, and third connection location;

a pivot extending from the first connecting location to the second connecting location;

a sensor coupled to the third connecting location; and

a U-shaped lever extending at least partially around a perimeter of the base defined by the three connecting locations, the lever having a first and second portion defining the sides of the U-shaped lever and a third portion connecting the first and second portions, the pivot intersecting the first portion and the second portion to couple the lever to the base; the sensor coupled to the lever to restrict the relative movement of the lever with respect to the base and capable of detecting the relative movement of the lever with respect to the base to sense the weight of the occupant.

28. The apparatus of claim 27, wherein the lever is configured to resist bending about an axis parallel to the pivot.

29. The apparatus of claim 28, wherein:

the first portion of the lever has a width extending in substantially the same direction as the pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the first lever from bending; and

the second portion of the lever has a width extending in substantially the same direction as the pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width to prevent the second lever from bending.

30. The apparatus of claim 27, wherein the sensor is coupled to the lever along the third portion of the lever.

31. The apparatus of claim 27, the lever is connectable with the seat along the first and second portions and pivotable about the pivot in response to forces applied to the seat.

32. The apparatus of claim 27, wherein the at least one support has a first wall supporting the first connection location, a second wall parallel to the first wall and supporting the second connection location, and a third wall normal to the first and second wall.

33. The apparatus of claim 32, wherein the third wall supports the third connection location.

34. A weight sensing apparatus adapted to isolate vertical forces from non-vertical forces applied to a load-bearing platform, the apparatus comprising:

a base having at lease one support extending in a vertically oriented direction with respect to the floor of the vehicle;

a first pivot having a first axis extending perpendicularly from the at least one support of the base;

a lever positioned adjacent to the base and coupled to the first pivot, the lever pivotable about the first axis;

a linkage adapted to connect the load-bearing platform to the lever, the linkage coupled to the lever and pivotable about at least a second axis, the second axis being substantially perpendicular to the first axis; and

a sensor coupled to the at least one support of the base and the lever.

35. The apparatus of claim 34, wherein the lever has a first end and second end, the lever configured to be coupled to the load-bearing platform at the first end and a sensor at the second end.

36. The apparatus of claim 35, wherein the first end of the lever is bifurcated.

37. The apparatus of claim 36, wherein the lever is configured to be coupled to the first pivot along the bifurcated portion.

38. The apparatus of claim 34, wherein the sensor extends between the support of the base and the lever, the sensor limiting the relative movement of the lever with respect to the base and capable of detecting the relative movement of the lever with respect to the base to sense the weight of a load.

39. The apparatus of claim 38, wherein the sensor comprises a hall effect sensor and a magnet, the magnetic field sensed by the hall effect sensor changing as the relative position of the lever with respect to the base changes.

40. The apparatus of claim 34, wherein the lever is configured to resist bending about an axis parallel to the first pivot.

41. The apparatus of claim 34, wherein the lever has a width extending in substantially the same direction as the first axis of the first pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width.

42. The apparatus of claim 34, wherein the lever is a first lever and the linkage is a second linkage, the apparatus further comprising:

a second pivot having a third axis extending perpendicularly from the at least one support of the base;

a second lever positioned adjacent to the base and coupled to the second pivot, the second lever pivotable about the third axis; and

a second linkage adapted to connect the load-bearing platform to the second lever, the second linkage coupled to the second lever and pivotable about a fourth axis, the fourth axis being substantially perpendicular to the third axis.

43. The apparatus of claim 42, wherein the second portion of the second lever and the second portion of the first lever overlap.

44. The apparatus of claim 43, wherein the sensor extends through the overlapping portions of each lever.

45. The apparatus of claim 42, wherein the forces transferred from the weight of the load to each lever are mechanically summed at the sensor.

46. The apparatus of claim 42, wherein the second lever is configured to resist bending about an axis parallel to the second pivot.

47. The apparatus of claim 42, wherein the second portion of the second lever has a width extending in substantially the same direction as the axis of the second pivot and a height extending in an at least partially vertical orientation perpendicular to the width, the height being greater than the width.

48. The apparatus of claim 42, wherein the second lever has a first end and second end, the second lever coupled to the seat at the first end and sensor at the second end.

49. The apparatus of claim 48, wherein the first end of the second lever is bifurcated.

50. The apparatus of claim 49, wherein the second lever is coupled to the second pivot along the bifurcated portion.

51. The apparatus of claim 34, wherein the at least one support of the base is defined by a first wall and a second wall parallel to the first wall, the pivot extending between the first wall and the second wall.

52. The apparatus of claim 51, wherein the lever is positioned between the first wall and second wall of the at least one support.

53. The apparatus of claim 51, wherein the lever is positioned adjacent the first wall, wherein the first wall is located between the lever and the second wall.

54. The apparatus of claim 51, wherein the sensor is coupled to the first wall.

55. The apparatus of claim 34, wherein the at least one support of the base is defined by a first wall, a second wall parallel to the first wall, and a third wall normal to the first and second wall, the pivot extending between the first wall and the second wall.

56. The apparatus of claim 55, wherein a first branch of the bifurcated portion is separated from a second part of the bifurcated portion by the first and second walls.

57. The apparatus of claim 56, wherein the sensor is coupled to the third wall.

58. The apparatus of claim 34, wherein the linkage is connected to the lever via a ball joint.

59. The apparatus of claim 58, wherein the lever has top surface and the linkage is connected to the lever via a ball joint along the top surface of the lever.